City of Boulder

Electric Municipalization Project
Administrative and Operational Issues Report

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Prepared By:

Steve Johnson
Bruce Swain
James Zalmanek

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1) Executive Summary

The City of Boulder (City) currently receives electricity from Xcel Energy through terms set forth in a Franchise Agreement, which expires in August 2010. The City is evaluating the viability of purchasing the electric distribution system physical plant from Xcel Energy and operating the electric distribution system as a municipal electric utility.

This report identifies the resources necessary to start and operate a municipal electric distribution utility on a day-to-day basis. Fleet Maintenance, Finance and Meter Reading Services operations can provide the necessary support with some incremental facilities, staff and training additions. The current Human Resources, Purchasing, and Accounting functions appear positioned to support the potential addition of a municipal electric distribution utility.

Equipment, staff, cost and operational data were collected from three cities in close proximity to Boulder. Loveland, Longmont and Fort Collins operate combined water, wastewater and electric distribution utilities. Based on the information received from these three cities, the annual and start-up costs were estimated for the City.

Annual operating costs and start-up costs were estimated in 2005 dollars. Based on the best available utility industry information, these costs are predicted to escalate between 2.5% and 3% per year over the next five years.

Annual operating costs	$15,892,000
Start-up costs	$27,873,000

This report contains four sections:

- Introduction provides an overview the City's current utility operations; recommendations from a Preliminary Municipalization Feasibility Study by R. W. Beck; and purpose, scope, process, data sources, assumptions, findings of this report
- Electric Utility Industry Overview including reliability, voltage standards, construction schedules and availability of personnel
- Electric Operations contains operational considerations for a typical electric organization structure
- Customer Service contains costs and operational considerations for the five functional areas including a call center, meter reading, billing, remittance processing, and credit and collections

The purpose of this report is to provide cost information, general organizational structure, and facility and vehicle requirements. Some information necessary to make decisions, such as revenue projections and customer impact are outside the scope of this report. If the decision were made to pursue municipalization of the electric distribution system, the next step would be the development of a Transition Plan.

2) Introduction

a) Overview of Current City Operations

The City of Boulder (City) is evaluating the viability of purchasing the electric distribution system within the city limits of Boulder from Xcel Energy. One of the many issues being researched in conjunction with this potential purchase is the annual cost associated with the operation of a municipal electric distribution utility.

There are approximately 2,000 municipal electric utility organizations across the United States. These municipal electric utilities range in size from several hundred to well over a million customers. Additionally, it is not uncommon for cities to operate the water, natural gas and wastewater utilities in their respective communities as well.

The City of Boulder currently operates the water, wastewater and storm water utilities. Consequently, the basic business or administrative functions currently exist to support the operation of a municipal electric distribution utility. These basic functions are meter reading, billing, incoming call center, credit and collections, remittance processing and a field workforce to complete customer related fieldwork.

The existing City's Fleet Maintenance, Finance and Meter Reading Services operations can provide the necessary support with some incremental facilities, staff and training additions. The current Human Resources, Purchasing, Accounting and Finance functions appear positioned to support the potential addition of a municipal electric distribution utility.

Finally, the Boulder City Comptroller has experience with the Federal Energy Regulatory Commission (FERC) Uniform System of Accounts for electric utilities, which may be used as the accounting system for the potential electric entity and to facilitate federal reporting requirements. While these basic business and support functions currently exist, the addition of a municipal electric distribution utility to the City's organizational responsibilities will require additional staff, facilities and various system expansions/enhancements.

The City does not currently have any of the equipment, facilities or professional staff required to operate a municipal electric distribution utility on a day-to-day basis. These electric utility resources include: experienced electric utility management; engineering, technical and line staff; adequate warehouse and storage yards; specialized vehicles and equipment; electric meter testing facilities; and electric system monitoring and maintenance systems.

On November 7, 2006, Boulder voters approved Initiative 202, the Climate Action Plan Tax, an energy tax based on the amount of electricity consumed by residential and commercial customers in Boulder. If the city of Boulder were to form its own municipal electric utility, a funding source similar to the Climate Action Plan Tax could be instituted or combined with other initiatives to support demand-side management programs and measures to reduce greenhouse gas emissions. The Climate Action Plan Tax is a pass-through tax and as such, does not directly affect the operating budget required for a municipal electric utility. Its impact, therefore, is not specifically called out as part of this analysis.

b) Purpose

The purpose of this specific study and report is to analyze the administrative and operational issues associated with the potential purchase of the electric distribution system in greater detail. This analysis includes the staff, equipment, facilities and systems and their associated estimated annual operating costs. Also included are the estimated capital costs to acquire the facilities, equipment and systems necessary to operate a municipal electric distribution utility.

c) Scope

This report answers the basic question, "What staff, equipment, facilities and costs would be required for the City of Boulder to operate a fully functional municipal electric distribution utility?"

The report provides:

- Annual capital, operating, and maintenance costs
- Additional facilities including land costs and building for a service center and warehouse, outside yard, office space, furniture, phones and computers
- Vehicles, equipment and tooling
- Electric material inventory
- Modifications to the existing automated meter reading system to accommodate electric meter readings

Positioning the City to operate a municipal electric distribution utility on "day one" if the decision is made to purchase the electric distribution system from Xcel Energy is a complex undertaking. The City will incur start-up costs to become a fully functioning electric distribution utility and should undertake the development of a detailed Transition Plan to assess the various operational needs, solutions and how to meet them in the short, mid and long term. This plan will help predict and manage these start-up costs.

While not all inclusive, the following list provides some examples of the major operational items that may be included in a Transition Plan:

- Attract experienced municipal electric distribution utility leadership and critical staff
- Develop a detailed inventory of the electric system to be purchased and transition/integration issues

- Evaluate existing distribution plant to develop a materials inventory
- Evaluate suitable facilities for an expanded utility operation
- Identify suppliers of electrical equipment and materials
- Develop business relationships with suppliers of electrical equipment and materials
- Determine what levels of contract services will be needed and enter into business agreements with electrical contractors
- Develop safety, construction and material standards and line clearance procedures
- Develop electric rate structures, rules and regulations
- Obtain or develop distribution system maps
- Develop Supervisory Control And Data Acquisition System (SCADA)
- Develop customer transition plan from Xcel to Boulder

d) Process

There are approximately 28 other cities in Colorado, which operate combined water, wastewater and electric distribution utilities. These utilities vary in size from several hundred customers to well over 180,000. Surveying each of these cities is neither practical nor would it yield the most meaningful results for the City of Boulder.

However, there are three cities in close proximity to Boulder, which do operate combined water, wastewater and electric distribution utilities. These are the cities of Loveland, Longmont and Fort Collins. They are of similar size, customer density, operating characteristics, geographic location and provide the most reasonable "operational fit" when assessing the operational components of a municipal electric distribution utility.

Each of these organizations was contacted and requested to provide equipment, staff, cost and operational data relative to their respective electric utility operation. The data received reflects how each electric utility organization is managed to best meet their respective community electric distribution system needs. Given the geographical proximity, customer base, community characteristics and similar operating conditions the data provides a very reasonable basis for predicting Boulder's operating costs.

e) Data Sources

The data gathered from these three cities and to a lesser extent Colorado Springs were used to estimate the annual operating costs for a fully functional municipal electric distribution utility. The data gathered is not attributed to any single organization due to differences in growth rates, operational and accounting practices. However, the data as presented in this report is sufficiently representative of the operating conditions that would exist within the City of Boulder.

Data was also gathered from the City of Boulder on its current organizational structure, functions, labor rates and certain overhead costs. Cost estimates obtained from either industry sources or vendors are specifically identified in the body of the report as necessary.

f) Assumptions

The following assumptions were used in the preparation of this report.

i) Electric System

- The electric distribution system is in average or above average operating condition and currently complies with all federal, state and local laws, rules and regulations.
- The electric distribution system currently complies with all applicable national, state and local electric safety codes and industry standards.
- The electric distribution system serves approximately 50,000 electric customers.
- The customer growth rate in Boulder is estimated to be 1% based on discussions with Boulder Staff.

ii) Staffing

- Existing and/or additional City staff will be used to support the administrative functions necessary to the operation of a municipal electric distribution utility.
- Skilled electric utility industry professional and craft personnel are currently in high demand in the labor market. This demand does not appear to be declining in the foreseeable future.

iii) Systems

- The Customer Information System (CIS) and Automatic Meter Reading (AMR) systems currently in use can be modified at a reasonable cost to accept and process additional electric accounts.
- The Federal Energy Regulatory Commission (FERC) Uniform System of Accounts for electric utilities can be created or the current general ledger accounting system can be modified to support the operation of a municipal electric distribution system using existing computer processing capacity.

iv) Facilities

- The City has the ability to obtain the necessary additional land to expand existing facilities or construct new facilities to support a municipal electric distribution utility.

g) Findings

Operating a municipal electric utility system is a complex and capital-intensive undertaking. The basic operation is funded through electric rates established by the Governing Board and is intended to provide sufficient revenue to support the day-to-day operations of the utility. These findings cover the operation and maintenance costs for the existing system and capital costs to extend electric distribution lines to new customers and install new street lights.

Start-up costs have also been estimated. Start-up costs are those costs necessary to begin business as a municipal electric distribution utility and cover facilities, vehicles and equipment, inventory, etc. Staffing levels and costs cover the addition of 71 employees, 60 of whom would be electric distribution systems employees with the remaining 11 in various supporting roles throughout of the City of Boulder organization. These payroll costs are already included in the operating and capital costs. Even though payroll costs have already been included, total payroll is listed below.
Cost detail is in Appendix F. All costs are in 2005 dollars and are expected to escalate at the rate of 2.5% to 3% per year

i) Operating Costs

The largest component of the costs associated with the day-to-day operation of a municipal electric distribution utility is operating costs. Operating costs of the electric system by the City of Boulder were estimated based on data collected from comparable Colorado municipal utilities of similar size. The categories and estimates in 2005 dollars are shown below:

Operation and Maintenance less Street Lights	$ 8,068,000
Street Light Maintenance	$ 127,000
Electric System Capital Investment less Street Lights	$ 4,213,000
Capital for Street Lights	$ 180,000
Allowance for undergrounding lines	$ 737,000
Payment in Lieu of Taxes	$ 2,567,000
Total	$ 15,892,000

The total of these categories is the annual operating cost necessary to support the operation of a municipal electric distribution utility by the City of Boulder.

The Operation & Maintenance (O&M) costs are based on per customer data received from surveyed utilities and applying that same ratio for Boulder.

Similarly, street light maintenance costs were estimated based on the number of street lights currently installed and maintained in the respective cities served by the surveyed utilities.

Please note the estimated City of Boulder electric utility O&M expense amount includes some expenses already paid by the City of Boulder Utility operation. Examples of these expenses would include utility billing and remittance processing costs; allocations to fund common organizational services such as Human Resources, Information Technology, Fleet Maintenance, City Manager and Attorney offices; and, other miscellaneous expenses. This fact may cause some nonmaterial overstatement of certain O&M expenses.

Major O&M cost categories can be found in appendix A.

ii) Capital Costs

Capital costs for infrastructure additions are necessary to extend electric service to new customers or provide increased or improved electric service to redeveloped areas. Regardless of the source of the increased demand, it dictates the installation of new electric distribution system infrastructure.

Capital cost estimates for the City of Boulder were based on building permit valuation comparisons obtained from the cities served by the surveyed utilities and then normalized for the City of Boulder. The Boulder estimate ($4,393,000 which includes $180,000 for street lights) is based on the estimate that the customer growth rate for Boulder is 1%. City of Boulder Staff has indicated the growth rate in recent years has been closer to 0.75%. This study did not involve creating growth projections for the City so the growth rate of 1% was used. If growth in Boulder is anticipated to occur at a different rate than 1%, the capital costs will need to be adjusted accordingly.

Electric utility infrastructure is capital intensive. As a result, utilities commonly charge development fees to builders, developers and customers requesting extension of electric distribution lines. These fees will offset the annual capital cost of $4,393,000 described in the previous paragraph. There has been no attempt to estimate these charges, as the philosophies used to set these charges vary significantly from utility to utility. As a result, the actual charges of the surveyed utilities differ significantly and it is not reasonable to estimate them. The line extension philosophy is set by the Governing Board and associated costs developed by the rate analyst.

The $180,000 capital cost for additional street lights is based on the cost information received from surveyed utilities. Using Boulder's projected annual growth rate of one percent, the existing 4,500 street lights would increase by 45 lights the first year. This is primarily for residential lights. Major thoroughfare lighting is more expensive. Street light construction involving a large number of major thoroughfare lights will increase the cost.

The survey of neighboring utilities indicates a higher number of installed street lights in proportion to the population than reported for Boulder. The survey ratio is one street light for an approximately 12 residents as compared to approximately 20 residents for Boulder. Boulder would need slightly more than 7500 lights to attain the same ratio. Communities have different lighting needs and the same ratio may not make sense for Boulder. If Boulder opts for more than a 1% increase in lights, the $180,000 would need adjustment accordingly.

Xcel dedicates a certain amount of funds annually to convert overhead electric lines in the City of Boulder to underground. This annual amount is based on 1% of the previous year's gross revenue less bad debts. For 2005, this was $737,000. This amount is included here to provide a better picture of capital investment currently dedicated to the electric distribution system in Boulder.

Estimated Payment in Lieu of Taxes (PILT), $2,567,000, for Boulder is based on the amount currently paid as an electric franchise fee by Xcel to the City of Boulder. It is common practice for utilities to pay a franchise fee to the city in which they operate. This permits use of public rights of way and easements for the placement of utility equipment. In the case of a municipal utility, this amount is commonly referred to as the payment in lieu of taxes. The City's Governing Board determines the amount of PILT, which is commonly based on a percentage of the gross electric revenues, collected in the City. There is no standard PILT for municipal electric utilities. The Governing Board in each community, which operates a municipal electric distribution utility, determines the amount of PILT based on overall community goals. The Governing Board for the City of Boulder can choose to adjust the PILT amount if the decision is made to take over operation of the electric distribution system.

iii) Start-up Costs

In addition to the operational costs, start-up capital costs were also considered. These start-up capital costs are defined as those costs necessary to acquire the facilities, vehicles, electric equipment and materials to begin operating a municipal electric distribution utility. They include:

Facilities – building, service yard, warehouse etc.	$18,218,000
Vehicles/tooling	$4,355,000
Electric Material Inventory	$2,300,000
Adapt AMR for Electric	$3,000,000
Total	$27,873,000

(1) Facilities

The facility estimated cost includes site acquisition, office space, protected warehouse and outside yard space, parking for employees, customers and equipment, and protected parking for environmentally sensitive equipment; i.e., bucket trucks. The office and warehouse space will accommodate 60 to 70 employees. Overall, site needs require 9 to 10 acres. Ten acres was used for the purpose of this estimate.

The estimated real estate purchase price of $15 per square foot was obtained from the City of Boulder staff for a 10-acre site. All office and computer costs are estimated for ergonomically designed furniture and cubicles.

The facility estimated cost detail can be found in Appendix B. The estimated cost data was obtained from the International Facilities Management Association, Rider Hunt Levett & Bailey Quarterly Construction Cost Report and the assistance of architects and estimators in the region. The costs used are average estimated regional costs. City of Boulder costs may vary depending on local requirements. As a result, the estimate was itemized to identify specific areas for review and if necessary adjustment.

(2) Vehicles

Appendix C provides details for equipment for the potential Boulder electric operation. There is a mix of 2-wheel and 4-wheel drive vehicles. On a day-to-day basis, 2-wheel drive vehicles will accomplish the work for the most part. The mix of 4-wheel drive vehicles becomes important when adverse weather effects day-to-day operations and becomes absolutely necessary when responding to major storm response for outage restoration.

The equipment for the field crew organization is required to complete both overhead and underground electric distribution system work. Some of the equipment is designed specifically to accomplish overhead line work while other equipment is designed to accomplish underground work. Many items on the equipment list are less specialized and can accomplish both types of work.

Each piece of equipment is assigned an estimated purchase price as well as an estimated tooling cost. Equipment purchase is a significant capital expenditure. There are alternatives to full cost capital outlay such as rental, lease/purchase option, and alliance/partnering. Each should be explored for their specific advantages. For the purpose of this study, purchase costs were identified for capital needs.

As a municipal energy provider, the City of Boulder will be required to follow Federal guidelines outlined in the Energy Policy Act of 2005. Vehicles under 8500 GVW must meet alternative fuel requirements such as natural gas, propane, ethanol blend, etc. Federal rules require tracking and reporting to the appropriate agency. The estimated vehicle costs represent the added costs of this requirement.

All equipment costs reflect fleet pricing.

(3) Electric Material Inventory

Electric utilities maintain material inventory for day-to-day as well as emergencies. The $2,300,000 inventory level is based on information received from two of the survey cities. One of the survey cities was excluded because their inventory was high to accommodate rapid growth as well take advantage of pricing of some high cost electric distribution system components. The inventory levels of the other two surveyed utilities more closely reflect circumstances that may exist in Boulder.

(4) Adapt AMR for Electric Meters

The existing Automatic Meter Reading (AMR) system currently supports reading water meters only. It will be necessary to adapt this system to allow existing equipment to also read electric meters. Converting existing electric meters to be compatible with the current AMR system in service will cost approximately $40 to $60 per meter, based on an estimated 50,000 electric meters. $3,000,000 is used in this report as the estimated cost to make this conversion.

While renting and contracting can delay some of these costs, they are included in the analysis to provide a complete picture of the costs associated with operating a municipal electric distribution utility.

This category of start-up capital does not include the cost to acquire the electric distribution system from Xcel, nor does it include the system reintegration costs necessary for Xcel to separate its system from Boulder and then reintegrate the remainder.

iv) Typical Organization Structure

The typical electric distribution utility organization structure found in Appendix E is based on the consultants' utility experience, observations of the structures of the surveyed utilities, as well Boulder's preferences and existing structure. The title of the chief executive of the proposed organization is Electric Director. In general, titles vary from company to company and change over time. In the event Boulder purchases the electric distribution system, it would be important to change the titles to those currently in use at the time to be consistent with Boulder's organizational norms.

Appendix E reflects the structure of a typical electric organization as well as employees in other parts of the current Boulder organization that provide the additional human resources needed to support the electric organization. These include Meter Technicians, Billing Service Representatives, a Rate Analyst, and a Mechanic.

The payroll impact of these positions is $4,400,500 per year. Payroll overhead cost to cover benefits are not included in this figure, but they were included in the operating and capital costs based on comparable costs in the surveyed utilities. Payroll overhead costs include pension, Worker's Compensation, insurance, vacation, sick leave and paid holidays. Appendix F details the positions, position count and general salary levels to staff the typical organizational structure discussed in the previous paragraph. They are listed here to provide details of the staffing requirement.

The salary ranges in Appendix F represent the average minimum and maximum salaries from the surveyed utilities. Salary data has been rounded up to the nearest $500 for simplicity. This data is not intended to be used as a comprehensive compensation study. Rather than being a comprehensive compensation study, this report identifies the general positions and salaries to estimate Boulder's payroll costs. Boulder's compensation philosophies are not reflected in this study.

The $4,400,500 estimate was computed by using maximum data for each of the positions. This was done to simplify the process. In actual practice pay for any individual would fall somewhere between the minimum and maximum rates. Consequently, the payroll estimate of $4,400,500 is probably a little higher than what would be encountered in actual practice. As stated previously, the payroll costs are already included in the operating costs because they were based on the survey data. Therefore, the operating costs already reflect typical payroll costs. The City of Boulder may find itself in a unique situation. Purchasing an electric distribution utility as Boulder is considering will require acquisition of personnel over a short time as compared to a utility that has been in operation for several years. This may result in actual salaries for specialized positions that are higher when compared to salaries of a utility that has been in operation for several years.

3) Electric Utility Industry

a) Overview

The electric utility has three basic segments: generation, transmission and distribution. Simply stated, the generation segment operates a variety of electric generation facilities, which generate electrical energy. The transmission segment transmits the electric energy produced through transmission grids. The distribution segment or local electric distribution utility supplies electrical energy to retail customers.

The City has experience operating hydro-plants and a co-generation plant, which produce electricity. These functions are normally associated with the generation segment of the electric utility business and not the retail or distribution segment of the industry.

Providing safe drinking water and wastewater service to Boulder is a business the City currently does well. Like the water and wastewater business, operating a retail electric distribution utility is a complex and challenging undertaking. Many of the business processes used to support the operation of the electric utility are the same as those currently in use for the water and wastewater utilities.

The obvious differences in the basic commodities supplied by each industry create interesting challenges for any organization. Managing and operating a municipal electric distribution utility requires competent, experienced leadership, electrical engineering expertise and a well-trained staff. It also requires a disciplined review of the current organization and associated business processes focused on providing utility product(s) to customers in the most efficient, economical and safe manner

b) Electric Reliability

A key measure for the performance of an electric distribution system is reliability. Many factors impact the reliability of an electric system. The City of Boulder has approximately 600 to 800 miles of distribution line within the area of the city. In some cases, a short circuit on one part of the system can cause a significant voltage fluctuation in other parts of the system. Electric distribution systems are only as good as the weakest point or part of the system. Consequently, they are vulnerable to possible failures and the resultant service interruptions because of the large exposure inherent in their nature and design.

Failures to the distribution system have many causes. The most frequent cause of outages is failure of electric distribution equipment including underground cable. Underground lines can be damaged by improper excavation. Both overhead and underground lines are vulnerable to short circuits by animals. Birds can span the distance to a live conductor thereby causing a short circuit. This can also happen with rodents on overhead lines. Rodents commonly chew through insulated cables causing failures. Automobile accidents are another cause of electric service interruptions.

Weather plays a large role in causing power outages. Colorado has a very high lightning incidence rate. Electric systems can be designed to minimize lightning caused failures but failures of this type cannot be eliminated.

Approximately 40% of Boulder's lines are estimated to be overhead. Overhead lines are susceptible to wind and snow. Both can cause damage directly to overhead lines or indirectly by carrying tree limbs or other debris and structures into the lines. These types of outages can be mitigated by consistent line clearing or tree trimming programs.

Any attempt to reduce costs in this area can have serious impacts for the following reasons. First, windstorms and especially early or late snowstorms that occur when there are leaves on trees can cause a large number of outages. Second, widespread and extended outages can cause difficult public relations problems. Finally, any costs saved by delaying line-clearing maintenance are easily exceeded when the program is resumed. Line clearing contractors charge approximately $2400 per mile to clear lines by trimming vegetation to a safe distance from conductors. Ideally, line-clearing activity takes place on the entire overhead system every four years.

All of these outage causes can be mitigated, but not eliminated, with quality equipment and good system design. Even with the purchase of seemingly good equipment, manufacturing defects can show up years after the equipment was purchased and installed. Manufacturers with good reputations will stand behind their equipment. However, this still necessitates replacement by utility personnel, and takes time and money to complete the work. It does not eliminate outages that occur on individual pieces of equipment prior to their replacement. Worse yet the actual replacement can result in a planned outage in order to safely make the replacement.

Generally, reliability can be improved by replacing lower quality equipment with equipment of higher quality or by changing the design of the system. Both of these methods are very expensive and can take a great deal of time and labor to implement. That is not to say that sometimes fairly significant improvements can be made with a minimum of time and money but this is the exception and does not happen often. The best method for improving reliability through design and material improvements is with a good failure analysis system. This is discussed in detail in the **Standards and Materials Management** section on page 18.

Reliability is also improved by reducing restoration times once a power outage occurs. Early information about outages is critical. An efficient outage reporting process initiates the restoration effort. Typically, this happens based on customer calls about the outage. It is possible to install equipment on substation and distribution circuit breakers that will send a page whenever the breaker operates under short circuit conditions. This can reduce the time interval for personnel to be aware of an outage.

Another method to speed awareness of an outage is a 24-hour staffed operation to receive customer calls and communicate this information to electric personnel. For a city the size of Boulder, it is probably more cost effective to use an answering service rather than an in-house staff to perform this function.

The next step in the restoration process is quick identification of the cause and location of the outage. In some cases, switching lines to reroute power around the cause of the power outage can restore service. If this is not possible, crews must be quickly dispatched with the necessary equipment and materials to restore service.

A Supervisory Control and Data Acquisition (SCADA) system can also facilitate quick outage restoration. Such a system not only receives information about circuit breaker operation but also has the added capability of remotely switching electric distribution lines to restore service to most if not all customers. This allows time for construction and maintenance crews to repair the problem.

The concept of reliability is somewhat subjective and differs based on the needs of the customer. As a result the electric utility industry has developed and generally endorses the Institute of Electrical and Electronic Engineers (IEEE) definitions in IEEE Standard 1366. While this standard covers many reliability definitions this section of the report will focus on the Customer Average Interruption Duration Index or (CAIDI). This is briefly defined as the average forced sustained interruption duration per customer served per year and is commonly measured in minutes. Usually it is reported for a year's data but shorter time frames can also be used. A company will record how much time each customer is without service and total the number. That number is then divided by all the customers served by the utility.

Published reliability surveys are not very common and usually only a small number of utilities participate. While comprehensive statistics are not available, the limited data available suggests typical annual CAIDI of approximately 30 to 280 minutes. Xcel is required by the Colorado Public Utilities Commission (Docket No. 05A-268E) to maintain a CAIDI no greater than 93 minutes or pay funds to customers.

The surveyed utilities reported 2005 values for CAIDI of 42, 51, and 79 minutes. Consequently, their reliability performance is higher than most utilities. This high electric system reliability is achieved through good system design, high quality materials, regular maintenance and efficient outage restoration methods.

c) Voltage Standards

Utilities are expected to provide electric service at reasonably constant voltage levels. However, as a practical matter, electric service voltage levels can fluctuate. The majority of these fluctuations occur because of changes in electric consumption on either the high voltage distribution line or the service line. It is rare that service voltages are impacted by the transmission system.

If voltage becomes higher than acceptable, customer appliances can receive too much power. This can cause overheating. If the voltage level is not too high, this overheating can be within the design criteria of the appliance. At higher voltage levels, the appliance can become damaged or even fail. At extreme high levels of voltage, failure can occur because of insulation breakdown. On the other hand, low voltage is less apt to cause failure except for motors. Electric motors will overheat under low voltage conditions and can ultimately fail.

In order to not damage customer equipment utilities are required to keep voltage within standard levels. This means that voltage at the electric meter must be 120 volts with a deviation of no more than plus or minus five percent. The American National Standards Institute ANSI C84.1 defines this standard.

d) Construction Schedules

It is important to maintain good construction schedules when working with developers, building contractors and homebuilders. New customers typically expect extension of electric system distribution lines in a matter of weeks. This time frame includes not only the actual construction but also the time necessary for a field engineer to analyze and develop detailed drawings for the line extension.

On rare occasions it is possible that a large construction project requiring a much longer time period may be necessary to meet customer needs. This can happen on large customer projects. Usually these projects are of such a size that the customer will need more time for completion of their project than the amount of time needed by the utility to meet the electric needs. Customers expect the utility not to be the source of delay for their project. They want the electric service available at the same time they are ready. In most cases, this is easy to accomplish as long as the customer communicates their needs to the utility early in their process. This expectation should be easier for Boulder to meet than most communities. The 1% growth rate estimate means line crews will work on a proportionately higher amount of system maintenance than is typical. Maintenance work, while important, is rarely as time critical as new electric service needs. As a result, it should be easier in Boulder to shift maintenance project schedules to meet customer schedules.

e) Availability of Personnel

The surveyed utilities all reported difficulty with finding and retaining qualified electric distribution utility personnel. This is particularly true of qualified line personnel and electric distribution engineering staff. The surveyed utilities have been in business for many years. Consequently, they have acquired their personnel over a long period to time. Acquisition for them has been in the form of hiring experienced electric distribution personnel or training of inexperienced people. Even with a full contingent of personnel, they are having difficulties with the retention and acquisition of staff. If Boulder opts to purchase the electric system, it will be necessary to hire a large number of qualified employees in a short period. It is not uncommon to have occasional personnel shortages. Such problems commonly occur from time to time in any business. Typical solutions have been:

- Attractive pay and benefits package
- Immediate and delayed signing bonuses
- Desirable work environment
- Flexible work schedules
- Opportunities for advancement and continuing education

In Boulder's situation, the problem is compounded because of the large number of employees to hire over a short time frame. Due to the challenge of literally managing an electric distribution utility from the start with little or no experience, it is critically important to have good staff in place. This will be an especially important component to be developed in the Transition Plan.

4) Electric Operations

The Electric Operations department described in this section is typical of other utilities. Two main functions of Electric Operations are Engineering Operations and Field Services. The managers of those two groups, along with an administrative specialist, would report to the Electric Director. Fully staffed, the department would contain 60 employees, with the personnel roughly split between the two groups.

If the decision is made to proceed with the purchase, the Electric Director and Field Services and Engineering Operations Managers should be the first employees hired. During the start-up phase, the Field Service and Engineering Operations Managers will be tasked with the following:

- Implementing the Transition Plan
- Hiring
- Developing construction and material standards
- Developing safety and line clearance procedures
- Contacting for power supply
- Developing customer policies and service applications procedures
- Managing inventory systems
- Acquiring a SCADA system
- Developing an electric distribution mapping system

a) Engineering Operations

The Engineering Operations Manager reports to the Electric Director and is responsible for field engineering, material and equipment standards, metering, substations, resource supplies, key customer accounts and energy conservation.

i) Field Engineering

The Field Engineering function processes requests for new electric service from customers and developers. Field Engineering Specialists analyze requests for new electric service to determine how much additional electric capacity will be needed to adequately meet the electric service needs identified in the customers' request. Once the needs are understood, they develop detailed electric system plans to extend the lines.

These plans must meet the National Electrical Safety Code and any standards developed within the Electric Department. These standards will be discussed in more detail in a later section. It is also important that the drawings meet any requirements the City of Boulder may have to coordinate location of utilities with in easements and rights of way.

Field Engineering is also responsible for the geographic information system (GIS). It is understood that Boulder has an existing GIS system in place. The electric data would be integrated with the existing system. It is assumed that this system can accommodate the additional data with a minimum of cost. As the distribution system is extended or modified, these records are entered into the GIS database. These records are required for overall system information, trouble shooting power outages, and to facilitate electric line locations and routine maintenance activities. One GIS Mapper is responsible for this activity.

ii) Standards and Materials Management

This function is supervised by an Engineering Supervisor and is responsible for construction and material standards as well as failure analysis, warehousing, inventory control and metering.

Construction standards are the collection of drawings the electric construction crews use when they build and extend electric distribution lines. These standards are necessary for many reasons. They ensure distribution lines are built to code and simplify the extension and modification of facilities. Without construction standards, facilities may need complete reconstruction, even for simple additions and modifications. This happens when facilities were initially constructed without considering all the possible additions and changes that might be needed in the future. Construction standards also need to consider the ease of construction and maintenance of facilities. Good construction standards are also essential for the reliability of the system.

The Electrical Projects Engineer and the Standards Engineer also provide material standards. Material standards encompass many aspects of dealing with electric materials. Primarily they are needed to ensure the organization purchases materials, which meet a minimum level of quality, and to simplify the purchasing process. Because material is the fundamental building block of the distribution system, it is also important that the materials purchased integrate properly with each other. For both material and construction standards the important consideration is that they integrate well into a complete distribution system.

Failure analysis is important for continually improving both the construction and material standards. Whenever there is a failure on the system, good failure analysis identifies the cause and implements solutions so that there is not a repeat of that type of failure. Failure analysis and solution implementation is the most important factor for ongoing reliability improvement.

The distribution system in one manner or another is built, operated, and maintained by every employee in the organization. As a result it is important that feedback from all parts of the organization be considered when developing and changing construction and material standards.

Some warehoused electric distribution system materials must be stored under cover while many of the poles, conduit, transformers, and switches may be stored outside. The warehouse must be designed in such a way as to minimize congestion when crews are picking up items. Inventory levels on high volume items must be adequate to minimize out of stock situations. On the other hand there may be items that have very low use activity that must be stocked because they are necessary to replace key equipment on the system should there be a failure.

It is valuable for warehouse/inventory control personnel to develop relationships with their counterparts in other utilities. While it is best to avoid material shortages, when they do happen a potential solution is to borrow/buy material from other utilities.

It is also useful to develop alliances with suppliers. The alliance requires the utility to commit to buying solely from that supplier for some specified period. This period varies but on average is three years. In return, the supplier commonly provides reduced prices, off site storage, reduced delivery times, prescheduled manufacturing schedules and training. This mutually beneficial agreement results in lowered costs to the utility and can help eliminate material or stock shortages.

The metering group calibrates electric meters before they are installed to assure accurate measurement. They are responsible for the integrity of all electric meters. They periodically test and maintain meters in the field. It is located in Standards and Materials Management because it is part of the material standards process of calibrating meters and because this group can more easily obtain technical assistance when needed.

iii) Planning, Operations and Substations

This group handles the balance of the engineering support for the organization as well as substation construction and maintenance. The engineers provide system planning, protective equipment coordination, operations and major project design as well as technical support to substations construction and maintenance group.

(1) <u>System Planning</u>

System planning ensures facilities are put in place in sufficient size to minimize the need to do frequent and expensive system rebuilds. They consider such issues as the trade off between the number of substations and the length of distribution mainlines. The cost and reliability trade offs involve striking a balance between having longer distribution mainlines and fewer substations as opposed to shorter lines and more substations.

(2) System Coordination

Where system planning may be immediately understood, protective equipment coordination may not be intuitively obvious. Protective equipment is similar to a house circuit breaker, but on a much larger scale. As in a house, protective equipment is necessary to minimize damage caused by a short circuit. Because of the complexity and larger geographic area covered by electric distribution system, it can be common on an electrical distribution system to have a breaker at a substation, another smaller breaker located further downstream on the system, possibly a fuse protecting a lateral line and finally another fuse on a transformer serving a residential customer. Power flows through all these devices on the way to the customer.

It is important that these protective devices are sized or "coordinated" with one another. At a minimum, proper "coordination" ensures two things. First, the device closest to the short circuit but located between the short circuit and the substation will operate before any other device. Second, it is the only device that operates. This improves reliability because it minimizes the number of customers without service and speeds the process of locating and correcting the problem.

(3) System Operations

Outages when they occur may be simple to rectify or quite complex. When the outage only impacts a small number of customers, restoration is straightforward. When the number of customers affected is large, or more than one protective device operates, or additional outages occur in the same time frame, restoration can create greater complexities for the restoration process. The system operators in System Operations are responsible for directing the outage restoration process. This process requires key system data such that the operators can quickly assess the degree and source of the outage and then develop and direct the restoration process. In the interest of customer relations and optimum system reliability it is desirable that this happen as efficiently as possible. Since outages occur at all hours of the day and night it is necessary to have some form of 24 hour call center in place. Two of the surveyed utilities utilize a 24-hour answering service to provide this need to minimize costs while the third maintains a 24/7 in-house operation. Customer calls provide a partial picture of the size and location of the outage. This information coupled with accurate maps of the electric distribution system, and good electric load data are necessary to facilitate the restoration process.

During day-to-day operations, the system operators will also provide line clearances for construction activities. Line clearances are the procedures that define how lines will be de-energized for the safety of crews doing construction or maintenance on the distribution system. Line clearance procedures are very strict in how they are set up as well as removed. The discipline and rigor detailed in these procedures is important for safety reasons. When a line crew is working on a de-energized line, it is critically important that the line not be mistakenly re-energized.

(4) Substation Construction and Maintenance

Substations are large transformer installations that reduce voltage from the transmission voltage to the voltage of the distribution system. The substation part of this group provides maintenance of the substations and may handle the labor for some additions and small substation construction projects. It is expected that larger projects be contracted because of the need for greater human and equipment resources.

iv) Resource Supply, Key Accounts, and Energy Conservation

Electric power would be purchased from the bulk power market in order to supply the City of Boulder with electricity. The Resource Supply Supervisor is also responsible for the purchase and coordination of "green power".

The Key Accounts Specialist is the liaison to large industrial and commercial customers as well as to the development and building community. This person's role is to be continuously sensitive to changing customer needs. The Conservation Specialist provides customer assistance regarding the wise and efficient use of electricity.

b) Field Services

The Field Services Manager reports directly to the Electric Director and is responsible for the majority of construction and field support for the organization. This includes electric distribution line and street light construction and maintenance, services, safety, training, locating and contracting.

i) Line Supervisors

The Line Supervisors are responsible for:

- New line construction
- Distribution line maintenance
- Troubleshooting
- Street light construction and maintenance
- Installation of secondary services

The line crews are mainly responsible for the installation, extension and maintenance of the distribution system. These extensions are made based on the electric system plans developed by the Field Engineers.

A well maintained distribution system is more reliable and over time less expensive than one not maintained. One of the larger elements of overhead line maintenance deals with the wood products. Wood cross arms and poles require periodic inspection and replacement as necessary. Line clearing or tree trimming is a critical maintenance requirement for overhead lines. For underground lines, maintenance commonly includes repairing equipment hit or bumped by vehicles, repairing problems caused by settling of improperly backfilled soil, and painting. For both overhead and underground, the failure analysis process discussed in the **Standards and Materials Management** section on page 18 drives the majority of the maintenance work. This process eliminates known defective equipment and inferior design and improves the overall quality of the system.

The electric troubleshooters in this section are primarily responsible for service restoration during outages. Troubleshooters are line specialists whose primary responsibilities are outage restoration and line switching. On smaller outages, they will restore service under their own direction. If for example it is determined that a fuse has blown on a transformer, they will simply replace the fuse. They will probably be one of the first people at the scene of a traffic accident if the accident involves utility equipment. For large outages, they will take direction from the System Operators. Troubleshooters also will perform the switching directed by the system operators to provide construction line clearances. They are also available to do numerous maintenance tasks that can be done by one person. They can rotate into or supervise crews during storms and other emergency work.

Troubleshooters are usually the first contact with customers when responding to outages and problems. Therefore, it is important that employees in this position have good skills in dealing with customers.

This section is also responsible for the installation and replacement of services. Services are low voltage lines running from the transformer to the customer's meter and don't require the larger construction vehicle and crew necessary for distribution line extension. Customers typically expect this work to be done within two to five days of their request for service.

ii) Safety and training

The construction and maintenance of high voltage electric lines is potentially dangerous. As a result, it is important to have in place safety procedures so that construction and maintenance work is done safely. Safety is the responsibility of everyone in the organization. The intention is to have in place methods that efficiently deal with safety issues and the avoidance of accidents.

Training as used here is primarily for the in house education of Line Specialists. Because of the present shortage of qualified line construction personnel, it is useful to develop this expertise in house as an additional route for acquiring qualified expertise. Training programs typically combine both classroom training with on the job experience. It is the responsibility of the Safety and Training Coordinator to develop the training programs as well as develop and manage the record keeping system to monitor the progress of employees in the program. It is wise to include a job evaluation program in this process. This process will consider input from Line Crew Supervisors as well as Line Specialists as another method to monitor progress. It is expected that the trainee will work on more than once crew during the training period. This coupled with the evaluation process emphasizes the need to the trainee of the importance to work effectively and safely regardless of which crews the employee is assigned.

iii) Locating

The Colorado One Call Law requires, among other things, that the owner or operator of an underground utility provide for location of underground facilities. The service is provided at the expense of the utility. Locating electric lines can be done with in house or contract crews. Two of the surveyed utilities found contracting this function to be cost effective. Contracting also eliminates the need for the utility to deal with the fluctuating workload common to this function. It is estimated that Boulder will need to respond to approximately 12,000 requests for electric line locations per year. Contract costs for the surveyed utilities are running approximately $10 per location.

iv) Contracting

Contract services can be advantageous for many reasons. From time to time workload can become too heavy for in house staff to keep up with work at reasonable lead times. It may also be advantageous to use contract services during the start-up period. Sometimes in house staff may not have the expertise or the specialized equipment to complete the required work. Some work is only done on occasion and it would not be prudent to gear up with qualified staff and equipment for work that cannot keep one crew occupied full time. This can be especially true when work is cyclical in nature. In such cases, a utility might maintain sufficient staff to handle the amount of work required during the slowest periods and will contract any work above this level. This avoids the need to staff for the peak periods and lay off personnel during the slow periods. It is also prudent that the contract services continuously monitor costs, as there can be some work that contractors can complete at lower cost than in-house utility staff. General experience has shown contracting distribution line extension work will cost approximately 30% to 40% more than the cost of in-house crews.

Landscape services can be needed to repair damage that may occur with construction or maintenance work. On some occasions, public input may require that enhanced landscaping take place to mitigate the adverse esthetic impact that can be caused by the installation of electric utility facilities. Because of the variability in this kind of work, this task is commonly contracted.

Storm response is another situation where contracting can be very useful. Should a storm cause major disruption of the distribution system, there might not be sufficient in-house resources to restore service in a timely manner. As an additional method for dealing with natural disasters, it is common for utilities to develop mutual aid contracts with other utilities to enable them to move crews from one utility to another for aid in extreme situations. Utilities are usually very willing to enter into such agreements. It is convenient to have such agreements with neighboring utilities because it allows a quicker response. It is also prudent to have agreements with utilities located at a greater distance. If the need for mutual aid arises from a destructive storm, that same storm may have place neighboring utilities in the same predicament thus limiting the amount of aid that can be expected.

The agreements formalize how this takes place. They typically include such things as:

- Work assignment procedures
- Procedures for checking out material
- Policies for feeding and housing crews
- Process for tracking time
- Payment methods

This list is not intended to be all-inclusive but rather to provide the general idea of the content of the contracts. Many municipal electric utilities already have contracts in effect with their neighboring utilities and these can be modified to meet Boulder's needs.

5) Customer Service

a) Introduction

The City of Boulder currently operates the water, wastewater and storm water utilities. Consequently, the customer service related functions and systems are currently in place to support the potential purchase of the electric distribution system.

If the decision is made to purchase the electric distribution system, additional staff and systems modifications will be required to accommodate the additional workload associated with managing additional electric accounts.

The City currently issues approximately 30,000 utility bills monthly using 17 billing cycles. The estimated number of potential electric accounts within the City is 50,000. At properties where there is a single water and electric meter, the change to the bill would be the addition of a single line item for the electric service.

However, the City would be issuing approximately 20,000 additional bills per month if the electric distribution system were purchased. The difference in the number of water accounts vs. the number of electric accounts is a function of a single water meter or master meter serving a multiunit complex while each individual unit within the complex is served by an individual electric meter.

Regardless of the number of services billed, all active accounts require the same basic business processes or cycles. Functionally, these are: a call center to receive customers requests for service and answer questions; meter reading to obtain readings on various meters which are used to calculate a bill; billing which process and mails the monthly billings; remittance processing which processes customer payments received for services rendered; and, credit and collections which deals with delinquent accounts.

If the decision is made to purchase the electric distribution system, additional customer service staff and modifications to existing systems will be required in each of these basic business areas as described below.

b) Customer Information System

The Customer Information System (CIS) must be able to accept and process additional electric accounts on "day one" if the decision is made to purchase the electric distribution system within the Boulder city limits. According to the City's CIS vendor Advanced Utility Systems Corp., A Harris Company, the recently installed CIS can be modified to accept and process additional electric accounts. The cost for this modification is estimated to be between $30,000 and $50,000. This estimate is based on a basic understanding of the potential addition of 50,000 electric accounts and not a detailed requirements definition. Therefore, the final cost to modify the CIS may vary dependent on the results of this detailed analysis.

c) Customer Service Organization

The City's Department of Public Works for Development and Support Services is responsible for providing customer service related business functions to the existing utilities operation. The only exception to this organizational responsibility is Meter Reading, which reports to the water utility operation.

The customer service functions include incoming calls, monthly billing including final bills, and remittance processing, staffing a front counter for customer assistance and payments and making payment arrangements. The current staffing level consists of 1 Billing Services Supervisor and 3 permanent and 2 temporary Billing Services Representatives. Each staff member is cross-trained to perform all functions within the area of responsibility. All staff members are proficient at taking incoming customer calls, processing monthly and final utility bills, processing customer payments and making suitable credit arrangements for payment of delinquent utility charges.

The most productive and beneficial approach to assessing the impact the potential purchase of the electric distribution system may have on the existing customer service staff is to focus on the specific business cycles or processes. The following sections use this business cycle or process approach for clarity and usefulness.

d) Call Center

The call center receives approximately 26,000 calls per year from the current customer base. The nature of these calls range from requests to start or stop service, bill questions and credit issues to general service questions and problems. The current service level used by the call center is maintaining an abandon call rate at or below 5%.

The potential purchase of the electric distribution system with an estimated 50,000 electric meters will add another line item to the monthly bill for the majority of the 30,000 customers who currently receive a utility bill from the City. In addition, an estimated 20,000 additional individual electric accounts will be added.

The customer turnover rate for electric accounts is consistently higher than any other commodity provided by utilities as depicted in Table I. This is especially true for multiunit dwellings with individual electric meters for each dwelling unit. The customer account turnover rate is significant because there is a direct correlation between higher customer turnover rates and the amount of work generated for the customer service functions in a utility. This additional workload is in the form of phone calls, meter readings and meter connection/reconnections.

Table I—Customer Turnover Rate

Organization	Customer Turnover Rate
City of Boulder	21% (Current)
Electric Utility A	35%
Electric Utility B	27%
Electric Utility C	44%
Electric Utility D	53%

The addition of this estimated number of individual electric accounts would impose a workload increase on this particular work group in the form of additional service requests that require processing. As noted earlier, the customer turnover rate for individually metered electric accounts is relatively high. This is true during normal monthly business cycles and will be exacerbated during the fall and spring timeframes that coincide with the beginning and ending of the academic year at the University.

If the decision is made to purchase the electric distribution system, the normal business related call volume is estimated to increase by approximately 51,000 calls annually. This will be especially true during the months of August/September and May/June when the University of Colorado school year begins and ends. During this specific timeframe, call volumes can be expected to increase an additional 15%.

The existing staff would need an additional 4 Billing Services Representatives to maintain their current service level annually. The service level would understandably be less during the peak months noted above.

The annual cost at 2005 pay rates for each of these additional positions is $26,000 to $41,500 per position. The estimated annual cost for these positions would be $104,000 to $166,000. An additional Billing Services Supervisor would also be necessary to provide adequate supervision and oversight. The annual cost for this position is $48,600--$77,750.

The estimated cost of additional office furniture and equipment is $30,000.

e) Meter Reading

While the Meter Reading organization does not report directly to the City's Department of Public Works for Development and Support Services, they are critical to obtaining the metering information necessary to calculate monthly and final utility bills. The existing Meter Reading staff consists of 5 Meter Service Technicians, 1 Lead Meter Service Technician and 1 Meter Shop Technician who are responsible for obtaining monthly meter readings using the Automatic Meter Reading (AMR) system, testing and repair of water meters as well as performing any maintenance work that is needed on the various electronic components of the system. They also replace or repair damaged water meters, obtain final meter readings when a customer leaves the water system and terminate water service when appropriate.

The City currently uses the Orion AMR system supplied by National Meter & Automation, Inc. to read water meters on a monthly basis. The AMR system utilizes radio technology to obtain meter readings. The AMR industry has available any number of systems to obtain meter readings. These range from radio frequency, to use of phone and electric lines to localized meter data collection networks. The purpose of any AMR system regardless of the technology chosen is to routinely gather utility meter consumption information and convey it to a Customer Information System (CIS) for processing.

Simply described, radio technology involves driving a specially equipped van through selected areas of the City on a daily basis. A radio signal is transmitted from the van to a radio receiver/transmitter attached to the water meters in the area. The meter readings are then transmitted to the van where they are stored and later downloaded to the CIS for bill calculation.

Orion currently has an AMR system which reads water and gas meters. It does not have a system capable of reading electric meters on the market at this time. However, Orion is presently developing a system to read electric meters as well. The Orion AMR system to read electric meters is scheduled to be available in the market place sometime during 2007.

When it is available, the AMR system to read electric meters will use the same radio technology as is currently used to read Boulders water meters. The current van equipment will require some minor upgrading with an associated minimal cost. However, the electric meters within the City of Boulder will need to be converted to use this particular system.

Xcel Energy, in conjunction with their current AMR system vendor, Itron launched a $15 million project in October 2004 to install an additional 200,000 AMR devices in the Boulder area. When completed, these devices would ideally read both the electric and gas meters. As part of this project, Xcel also invested in 50,000 new solid-state electric meters. The status of Xcel's deployment of this AMR technology in the Boulder area is not known at this time.

The most effective leveraging of the City's investment in the current water AMR system would be to include reading electric meters with the Orion system. This would be accomplished through converting each electric meter in service at the time of purchase to be compatible with the new Orion electric meter AMR system. Boulder's AMR system vendor is understandably cautious at this time about releasing any meter conversion cost information until their electric meter reading system is fully developed, tested and available to the market.

There is any number of AMR systems available in the market places that use basically the same technology. While each of these systems is proprietary due to design differences to accommodate various customer needs, the technology is virtually the same for radio systems. A survey of the various companies who offer a line of equipment using the radio technology was conducted in order to estimate a range of costs that may be expected to convert all the electric meters within Boulder.

The average cost to convert a standard electric meter to a radio AMR system compatible electric meter is \$40 to \$60 per meter. Assuming a total electric meter count of 50,000 for the City, the estimated conversion cost would be \$2,000,000 to \$3,000,000.

It must be emphasized these are AMR industry average costs using radio technology and do not reflect nor represent Orion's ultimate price per unit to convert and read all electric meters in the City using their particular system.

The ability to read meters and generate a bill must be in place on "day one" following the potential purchase of the electric distribution system. The City may have options other than the one explained above to accomplish this task. These options could include purchasing the Itron AMR system in service at the time of purchase as a parallel system to the Orion system or contracting with Xcel to continue to read and bill Boulder's electric meters for a period of time. The viability of these and other options will require additional analysis.

Regardless of the AMR solution selected for reading both electric and water meters, reading 50,000 additional electric meters at the same time as water meters are read will not impose an additional work load on the current Meter Reading staff. However, if the City desires to utilize the existing Meter Reading staff to deal with metering issues in the field, the major impact on the Meter Reading work group if the decision is made to purchase the electric distribution system will come from potentially two sources; increased maintenance of approximately 50,000 additional AMR devices on electric meters and an increase in the frequency of customer related requests for service. This latter item will take the form of increased requests for final meter readings and the number of electric meter connects/disconnects for any number of reasons.

The electric utility industry has for the most part moved toward training staff like Meter Readers, Field Collectors and Field Service Representatives to connect and disconnect electric meters at residential and small commercial locations. The potential purchase of the electric distribution system in Boulder would lend itself to utilizing the existing Meter Reading staff to perform this function with some specific electric safety and meter training for the current and additional staff.

The addition of 2 positions to the existing Meter Reading staff would be necessary to deal with the estimated field workload associated with the potential purchase of the electric distribution system. The estimated cost at the current pay rate for this classification for the 2 added positions is $52,000 to $83,240 annually.

The addition of electric meter disconnection/reconnection responsibilities may increase the pay for these positions to a certain extent. A detailed position analysis by the City Human Resource staff would determine any potential pay increase.

Another option would be the creation of Field Service Representative or Field Collector job classifications to handle the combined electric/water meter disconnection/reconnection fieldwork. This latter option would involve restructuring of job functions and detailed classification analysis by the Human Resources staff to pay the new positions correctly.

A basic position description and pay range for similar positions at surveyed utilities is included in Appendix F for information purposes only and is not intended to replace the position evaluation process currently used by the City.

The estimated cost for additional equipment and vehicles is $43,500.

f) Credit & Collections

The Billing Service Representatives currently deal with credit and collection issues. They are responsible for mailing all delinquency and service termination notices, making acceptable payment arrangements or sending a service order to Meter Reading to terminate water service.

The City issued approximately 17,500 Notices of Discontinuance in 2005. Actual disconnection of the water service occurred in approximately 300 instances, which is less than 2% of the time. This low percentage of actual service termination to notices mailed indicates the customer either paid what was due or made acceptable payment arrangements.

There are two mitigating factors, which influence this current low service termination rate. The first is the City's ability to file a tax lien on a property for unpaid water and wastewater charges. The second is the length of time a customer has from initially receiving a bill for water service to the actual water service termination. The time currently allowed by the City is between 100 and 110 days.

It is not known at this time whether the City would chose to extend this same tax lien option to unpaid electric service charges through a public process to amend the existing City Ordinance. Regardless of that decision, effort will need to be focused on developing a credit and collection policy for the City should the decision be made to purchase the electric distribution system.

From a business perspective, allowing customers 100 to110 days to pay a delinquent bill without receiving some level of payment, acceptable payment arrangements or terminating the service is extremely generous. The customer has created an additional 3 months of debt during this period.

The average time allowed for customers of the surveyed municipal electric utilities to pay a delinquent bill, make acceptable payment arrangements or have the electric service terminated is between 43 and 50 days. This shorter timeframe is in place to limit the amount of additional debt created by a customer and the potential costs associated with writing the debt off which is ultimately a cost to all customers.

It is estimated the City will issue an additional 50,000 delinquency notices annually should it decide to purchase the electric distribution system.

Potential acquisition of the electric system will increase the credit and collection activities in the office as well as the field. The number of delinquency and termination notices will increase as well as the need for payment arrangements. The field activity associated with this increased credit and collection activity, specifically termination of electric service will increase as well. Customer termination percentages for the surveyed municipal electric utilities are depicted in Table II.

Table II—Customer Termination Percentage

Organization	Percentage of Notices to Termination
City of Boulder	2% (Current)
Electric Utility A	4%
Electric Utility B	7%
Electric Utility C	10%
Electric Utility D	13%

The average percentage of actual electric service terminations compared to number of delinquency notices mailed is approximately 8.5%. Stated differently, for every 100 delinquency notices mailed, approximately 8 customers on average will require termination of service to secure payment.

Applying this average percentage of estimated increase of mailed delinquency notices for the City increases the number of accounts requiring service termination to approximately 5,730 accounts annually. This increase in credit and collections activity is the basis for the added field staff identified in Meter Reading and a portion of the reasoning for the staff additions in call center and billing areas.

g) Billing

The focus of this process is to assure the accuracy of monthly utility bills and to process them in a timely manner. The same staff as described for the Call Center staffs this function.

They are also responsible for processing all final bills when a customer either moves within the Boulder utility system or leaves. This is accomplished through a telephone call from the customer; issuing a service order to Meter Reading for a final meter read; and, manually entering this information into the CIS. The customer's final bill is processed that night and ready to be mailed the following morning.

The potential purchase of the electric distribution system will add a single line item to approximately 30,000 monthly water bills that are currently processed by this staff. However, an estimated 20,000 additional individual electric accounts will also be acquired.

The customer turnover rate for those customers with existing water service will increase slightly. This turnover rate is manageable at the current time with existing staff. Hence, the addition of another line item to the bill for electric service will have minimal impact. Just the opposite is true for the additional individually metered electric customers.

The addition of this estimated number of individual electric accounts would impose a moderately high workload increase on this particular work group in the form of additional monthly bills that require processing. As noted earlier, the customer turnover rate for individually metered electric accounts averages between 35% and 45% annually. This is true during normal monthly business cycles and will be exacerbated during the fall and spring timeframes that coincide with the beginning and ending of the academic year at the University.

A workload increase will be associated with the potential acquisition of additional electric accounts. The most significant increase in workload for this group will be in the form of a 60%-70% increase in the number of final customer bills that will require attention. The City will issue approximately 6,500 final bills during 2006. (Final bill data for 2005 is unreliable therefore, 2006 data from the new billing system is used to estimate 2006 final bill activity.) Final bill activity is estimated to increase to 10,400—11,500 final bills annually. The current staff would not be able to process this increased number of final customer bills in a timely manner.

The importance of timely processing of final customer bills cannot be overemphasized. Once a customer leaves the utility supply system, it is in the best interest of the utility to render an accurate and final bill as soon as possible to assure prompt payment. Any lapse in the timing of the delivery of the final bill reduces the probability of prompt payment.

The Billing work group will need to hire 2 additional Billing Services Representatives to accommodate this increased workload should the decision be made to purchase the electric distribution system.

The estimated annual cost for these 2 positions is $52,000--$83,000. The cost for additional office furniture and equipment is $12,000.

h) Remittance Processing

The same individuals who staff the Call Center, Billing, Credit & Collections and front counter accomplish the remittance processing business function.

The City received 319,855 utility bill payments in 2005. These payments were processed through a variety of methods to include: lockbox (59%); electronic lock box (7%); ACH (19%); credit cards (8%); and, utility counter payments (7%).

Adding an estimated 50,000 electric accounts will not adversely impact this particular business process to the extent of the others described above. This is due primarily to the use of a third party to process approximately 85% of the remittance processing items. Therefore, no staff additions would be necessary for this business process should the decision be made to purchase the electric distribution system.

i) Customer Service Findings Summary

		Estimated Cost	
Work Unit	Added Staff (1)	Staff (2)	Furniture/Equipment
Call Center	5	$243,750	$30,000
Meter Reading	2	$83,000	$43,500
Credit & Collections	0	-0-	-0-
Billing	2	$ 83,000	$12,000
Remittance Processing	0	-0-	-0-
Total	9	$409,750	$85,500

Systems

Customer Information System	$30,000--$50,000
Automatic Meter Reading	$2,000,000--$3,000,000
Total	$2,030,000--$3,050,000

(1) See Appendix E, for Customer Service organization chart.
(2) Estimated customer service staff costs do not include payroll overhead costs of 48% to cover benefits such as pension, Worker's Compensation, insurance, vacation, sick leave, and paid holidays, but they were included in the operating and capital costs based on the surveyed utilities.
Note: Additional costs for bill preparation, processing, inserting, mailing; delinquency notice printing, processing and mailing; and, remittance processing are included in the $15,892,000 O&M cost amount.

6) Report Information Sources

- R. W. Beck, Preliminary Municipalization Feasibility Study, October 2005
- Public Service Company of Colorado, Annual Report City of Boulder for Year Ended December 31, 2005
- City of Boulder staff
- Municipal electric utilities in Loveland, Longmont, Fort Collins and Colorado Springs
- Advanced Computer Systems, A Harris Company
- National Meter & Automation, Inc.
- Automatic Meter Reading Association
- American Public Power Association
- Colorado Association of Municipal Utilities
- American National Standards Institute
- Institute of Electrical and Electronic Engineers
- National Electric Code
- National Electrical Safety Code
- International Facilities Management Association
- Rider Hunt Levett & Bailey Quarterly Construction Cost Report
- Federal Energy Regulatory Commission (FERC) Uniform System of Accounts for Electric Utilities

Appendix A: Major O&M Cost Categories

MAJOR O&M COST CATEGORIES

Distribution Operations	$	2,949,000
Distribution Maintenance	$	1,369,000
Customer Account Expenses	$	1,262,000
Customer Service & Information Expenses	$	1,112,000
Administrative & General Expenses excluding PILT	$	1,503,000
Total	$	8,195,000

Appendix B: Boulder Electric Facility

BOULDER ELECTRIC FACILITY

SITE REQUIREMENT				
Building & Employee Parking			4.0 Acres	
Yard Space & Crew Vehicle/Equipment			6.0 Acres	
Site Total			10.0 Acres	
10 Acres 435,600sf $15sf				$6,534,000
CONSTRUCTION COST (HARD COST)				
Office/Crew	24,000sf	$190sf	$4,560,000	
4 Tier Warehouse	17,000sf	$100sf	$1,700,000	
Protected Parking	4,500sf	$83sf	$373,500	
Site Development	435,600sf	$6sf	$2,613,600	
TOTAL				$9,247,100
SOFT COST				
Design	7% of Building Cost		$464,345	
IT Network, Fiber	8% of Building Cost		$530,680	
Security, Gates, Access Control	5% of Building Cost		$331,675	
Moves, Insurance, Permits, Testing, Contingency	5% of Building Cost		$331,675	
Site Development, Entitlement, Plat Fees, Tap Fees	5% of Hard Cost		$462,355	
TOTAL	32% of Building Cost[1]			$2,120,730
OFFICE/COMPUTER COST				
Office Furniture/Computer	36 workstations	$6,000[2]	$216,000	
Crew Furniture/Computer	24 workstations	$2,000[2]	$48,000	
TOTAL	60 workstations			$264,000
SERVICE CENTER TOTAL				**$18,165,830**
SUPPORT SERVICE				
Office Furniture/Computer	8 workstations	$6,000[2]	$48,000	
Crew Furniture/Computer	2 workstations	$2,000[2]	$4,000	
TOTAL	10 workstations			$52,000
ELECTRIC/SUPPORT SERVICE TOTAL				**$18,217,830**

[1] Please note these percentages have different bases and cannot be added arithmetically
[2] Cost per workstation

Appendix C: Boulder Vehicle Inventory and Cost

BOULDER VEHICLE INVENTORY AND COST

The spreadsheet on the following page represents the core equipment for the Boulder Electric Operation. There is a mix of 2-wheel and 4-wheel drive vehicles. On a day-to-day basis, 2-wheel drive vehicles will accomplish the work for the most part. The mix of 4-wheel drive vehicles becomes important when adverse weather effects day-to-day operations and becomes absolutely necessary when responding to major storm response for outage restoration.

The equipment needed for the field crew organization is required to complete both overhead and underground distribution work. Some of the equipment is designed specifically to accomplish overhead work while other equipment is designed to accomplish underground work. Many items on the equipment list are shared to accomplish both.

Each piece of equipment is assigned an estimated purchase price as well as an estimated tooling cost. Equipment purchase is a significant capital expenditure. There are alternatives to full cost capital outlay such as rental, lease/purchase option, and alliance/partnering. Each should be explored for their specific advantages. For the purpose of this study, purchase costs were identified for capital needs.

As a Municipal energy provider, the City of Boulder will be required to follow Federal guidelines outlined in the 1996 EPACT Regulation. Vehicles under 8500 GVW must meet alternative fuel requirements such as natural gas, propane, ethanol blend, etc. Federal rules require tracking and reporting to the appropriate agency. The estimated vehicle costs represent the added costs of this requirement.

All equipment represents fleet pricing.

BOULDER VEHICLE INVENTORY AND COST

Vehicle Description	Number of Units	New Purchase Cost	Total Vehicle Cost	Tooling Cost	Total Vehicle & Tooling Cost
Sedan	10	$ 17,500	$ 175,000	$ -	$ 175,000
SUV	7	$ 23,000	$ 161,000	$ -	$ 161,000
1/2-Ton Pickup 2X4	1	$ 18,500	$ 18,500	$ 500	$ 19,000
1/2-Ton Pickup 4X4	1	$ 21,000	$ 21,000	$ 500	$ 21,500
3/4-Ton Pickup 2X4	1	$ 18,500	$ 18,500	$ 500	$ 19,000
3/4-Ton Pickup 4X4	1	$ 22,000	$ 22,000	$ 500	$ 22,500
3/4-Ton Crewcab Pickup 4X4	2	$ 24,500	$ 49,000	$ 1,000	$ 50,000
1-Ton Flatbed 4X4	1	$ 26,500	$ 26,500	$ 500	$ 27,000
1-Ton Utility Bed 2X4	1	$ 33,500	$ 33,500	$ 500	$ 34,000
1-Ton Utility Bed 4X4	1	$ 36,000	$ 36,000	$ 500	$ 36,500
Electric Line Bucket Truck 2X4	2	$ 140,000	$ 280,000	$ 50,000	$ 330,000
Electric Line Bucket Truck 4X4	1	$ 160,000	$ 160,000	$ 25,000	$ 185,000
Digger Derrick 2X4	1	$ 140,000	$ 140,000	$ 5,000	$ 145,000
Digger Derrick 4X4	1	$ 190,000	$ 190,000	$ 5,000	$ 195,000
Trouble/Street light/Service Bucket Truck	4	$ 90,000	$ 360,000	$ 68,000	$ 428,000
Dump Truck	1	$ 119,000	$ 119,000	$ 500	$ 119,500
Backhoe	2	$ 90,000	$ 180,000	$ -	$ 180,000
Backhoe Trailer	2	$ 20,000	$ 40,000	$ 1,000	$ 41,000
Pull Behind Compressor	1	$ 17,500	$ 17,500	$ 3,500	$ 21,000
Material Truck	1	$ 70,000	$ 70,000	$ 2,000	$ 72,000
Flatbed Truck w/Reel Stands and Knuckle Boom	3	$ 110,000	$ 330,000	$ 6,000	$ 336,000
Box Van for Underground and Substation Work	4	$ 70,000	$ 280,000	$ 100,000	$ 380,000
17-Ton Truck Mounted Crane	1	$ 200,000	$ 200,000	$ 5,000	$ 205,000
Single Wire Trailer	3	$ 22,000	$ 66,000	$ -	$ 66,000
2-Reel Trailer	1	$ 25,000	$ 25,000	$ -	$ 25,000
3-Reel Trailer	1	$ 35,000	$ 35,000	$ -	$ 35,000
Underground Cable Puller/Wrecker	1	$ 95,000	$ 95,000	$ 500	$ 95,500
Underground Puller/ Cable Installer	1	$ 85,000	$ 85,000	$ 500	$ 85,500
Overhead Distribution Puller	1	$ 65,000	$ 65,000	$ 500	$ 65,500
Overhead Distribution Tensioner	1	$ 35,000	$ 35,000	$ 500	$ 35,500
Extendable Pole Trailer	1	$ 16,000	$ 16,000	$ -	$ 16,000
Easement Machine	1	$ 110,000	$ 110,000	$ -	$ 110,000
Snowcat w/Trailer	1	$ 120,000	$ 120,000	$ 1,000	$ 121,000
Snowmobile w/ Trailer	2	$ 10,000	$ 20,000		$ 20,000
Warehouse Indoor/Outdoor Forklift	1	$ 75,000	$ 75,000	$ 500	$ 75,500

City of Boulder Electric Municipalization Report

Vehicle Description	Number of Units	New Purchase Cost	Total Vehicle Cost	Tooling Cost	Total Vehicle & Tooling Cost
500 KW Generator	1	$ 85,000	$ 85,000	$ 500	$ 85,500
Ride on Trencher w/Trailer	2	$ 85,000	$ 170,000	$ 500	$ 170,500
Cable Thumper	1	$ 35,000	$ 35,000	$ -	$ 35,000
Hotstick Trailer & Inventory	1	$ 80,000	$ 80,000		$ 80,000
Protective Equipment				$ 20,000	$ 20,000
Mechanics Tooling				$ 10,000	$ 10,000
Totals			**$ 4,044,500**	**$310,000**	**$ 4,354,500**

Notes: All pickup costs are based on an extended cab design.
Add $2500 for crew cab or deduct $2300 for regular cab.

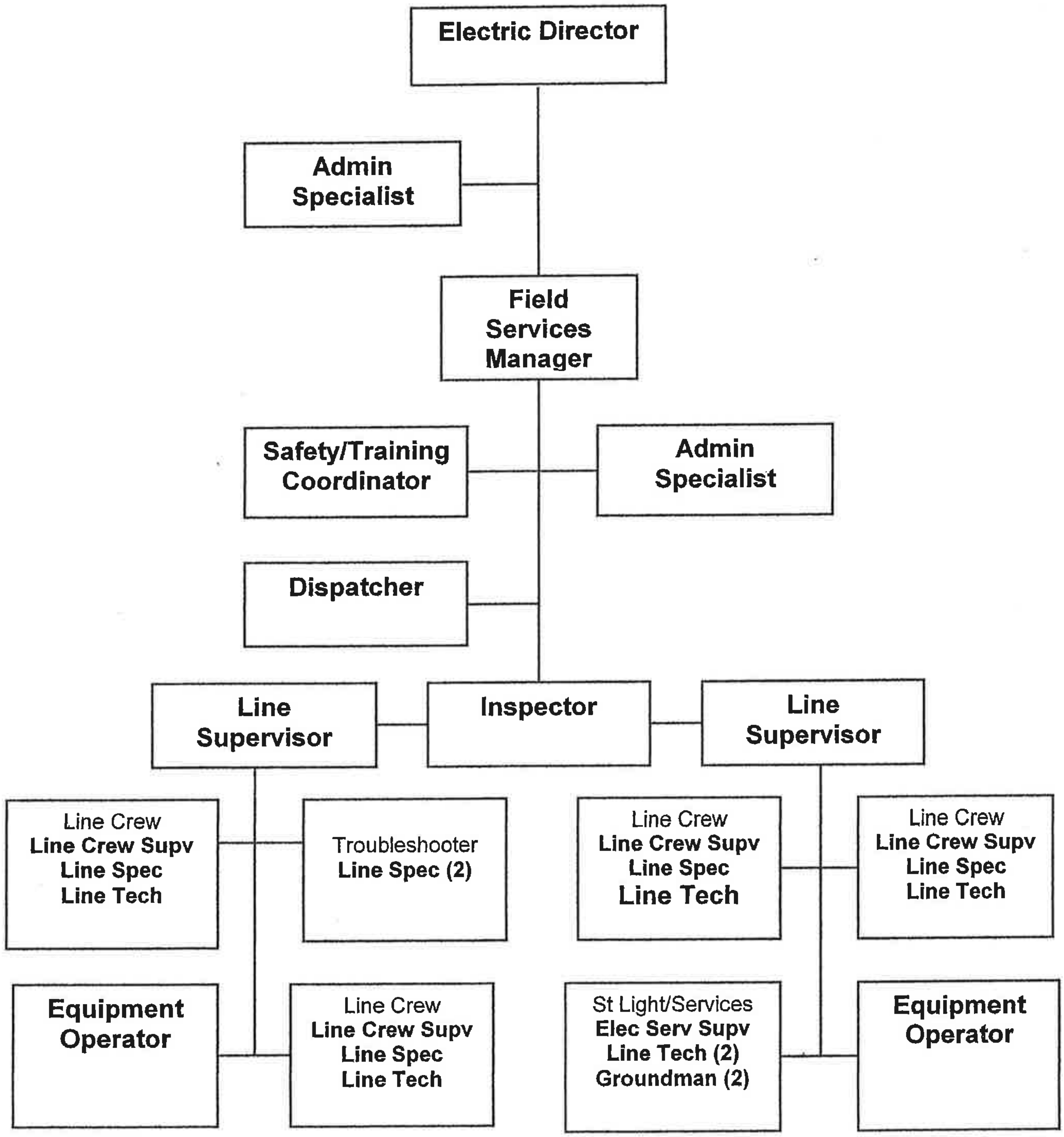
Appendix D: Boulder Vehicle Maintenance and Fuel Cost

BOULDER VEHICLE MAINTENANCE AND FUEL COST

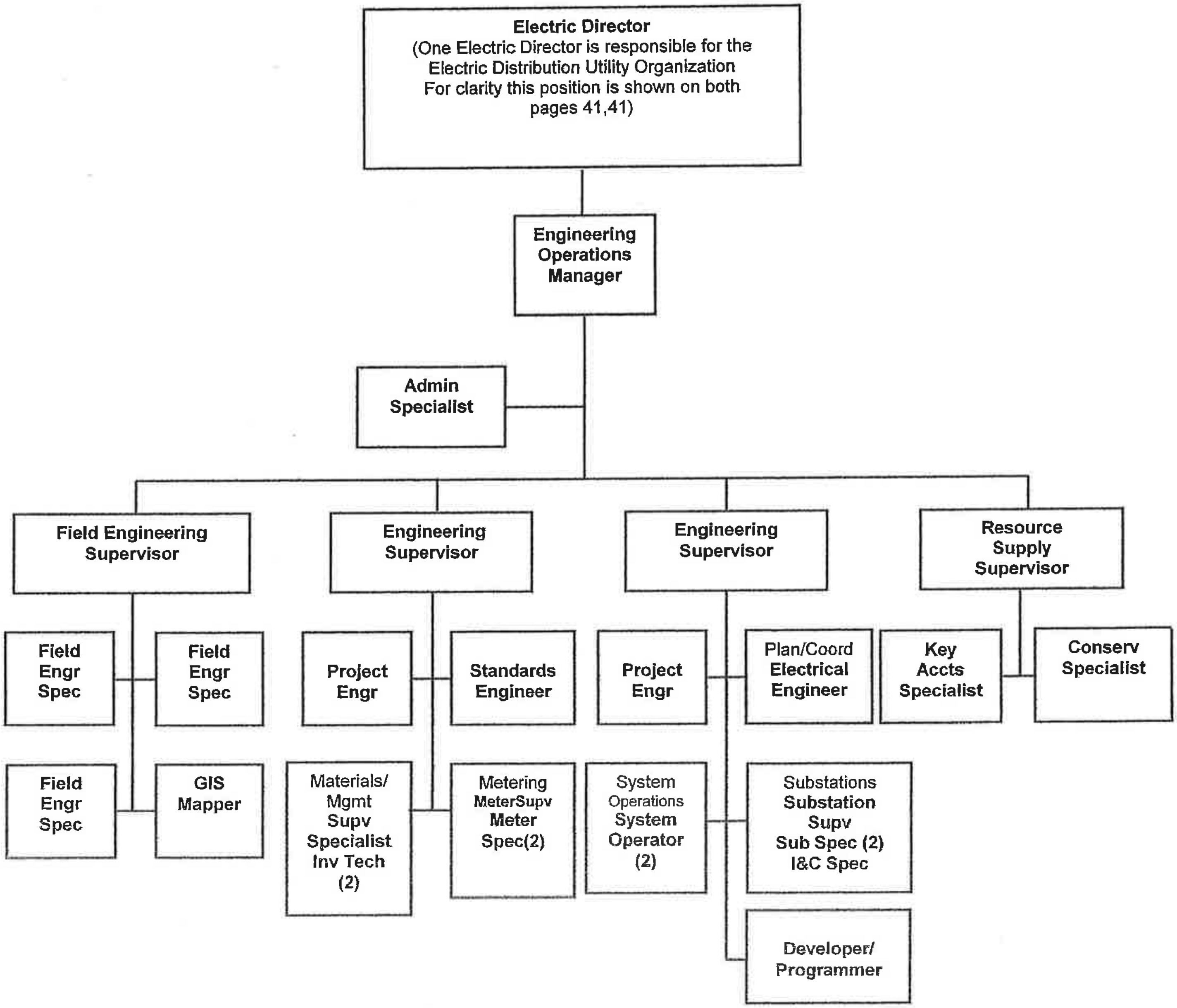
Vehicle description	Maintenance Cost Expectations	Expected Fuel Economy
Sedan		19mpg
SUV		15mpg
1/2 ton pickup 2X4		15mpg
1/2 ton pickup 4X4		15mpg
3/4 Ton pickup 2X4		13mpg
3/4 Ton pickup 4X4		13mpg
3/4 Ton Crewcab Pickup 4X4		
1-ton Flatbed 4X4		10mpg
1-Ton Utility bed 2X4		10mpg
1-Ton Utility bed 4X4		10mpg
Electric line bucket truck 2X4		6mpg
Electric line bucket truck 4X4		6mpg
Digger Derrick 2X4		6mpg
Digger Derrick 4X4		6mpg
Trouble truck		10mpg
Street light/Service bucket truck		6mpg
Dump truck		6mpg
Backhoe		4gallons/hr
Backhoe trailer		0
Pull behind compressor		2gallons/hr
Material truck		6mpg
Flatbed truck w/reel stands and knuckle boom		6mpg
Box van for underground/substation work		6mpg
17 ton truck mounted crane		4mpg
Single wire trailer		0
2-reel trailer		0
3-reel trailer		0
Underground cable puller/wrecker		2gallons/hr
Underground puller/ cable installer		2gallons/hr
Overhead distribution puller		2gallons/hr
Overhead distribution tensioner		0
Extendable pole trailer		0
Easement machine		2gallons/hr
Snow cat w/trailer		4gallons/hr
Snowmobile w/ trailer		1gallon/hr
Warehouse indoor/outdoor forklift		2gallons/hr
500 KV generator		1gallon/hr
Totals		

Appendix E: Typical Organization Structure

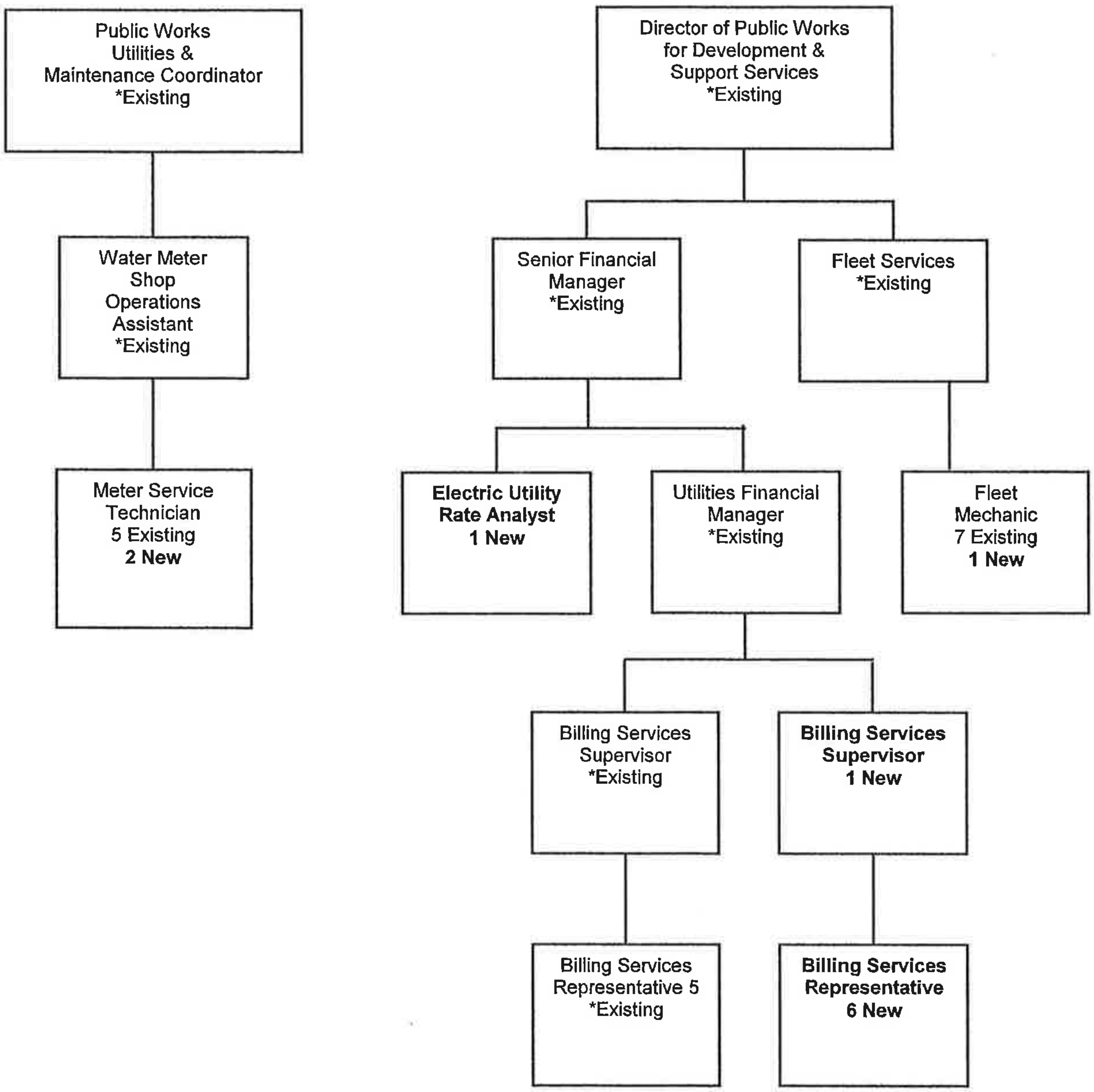
Field Crew Organization



Engineering/Operations Organization



Support Functions



New employees added to existing structure are in **BOLD**

Appendix F: Boulder Positions and Salaries

The Boulder Position/Salaries spreadsheet on the following page shows the positions, position count and general salary levels for the potential City of Boulder Electric Operation.

The salary ranges are the average compensation from the comparative compensation spreadsheet data. The salary data has been rounded up to the nearest $500.00 for simplicity.

As stated previously, the data is not intended to be used as a comprehensive compensation study. Rather, the intent is to identify the general positions and general salaries for estimating purposes of the study.

BOULDER POSITIONS AND SALARIES

POSITION	COUNT	MIN/MAX SALARY	SALARY	TOTAL
Electric/Utility Director	1	$86,500 - $125,000	$125,000	$125,000
Engineering/Operation Manager	1	$76,000 - $110,000	$110,000	$110,000
Engineering Supervisor	2	$ 66,000 - $ 93,500	$ 93,500	$187,000
Project Engineer	2	$ 49,000 - $ 68,500	$ 68,500	$137,000
Electric Engineer	1	$ 57,000 - $ 85,000	$ 85,000	$ 85,000
Field Engineering Supervisor	1	$ 54,500 - $ 79,000	$ 79,000	$ 79,000
Field Engineer Specialist	3	$ 45,000 - $ 64,000	$ 64,000	$192,000
Electric Utility Rate Analyst	1	$ 52,500 - $ 74,000	$ 74,000	$ 74,000
Resource Supply Supervisor	1	$ 57,500 - $ 82,500	$ 82,500	$ 82,500
Key Accounts Specialist	1	$ 46,000 - $ 65,000	$ 65,000	$ 65,000
Conservation Specialist	1	$ 43,000 - $ 64,500	$ 64,500	$ 64,500
Substation Supervisor	1	$ 53,000 - $ 75,000	$ 75,000	$ 75,000
Substation Specialist	2	$ 45,000 - $ 63,000	$ 63,000	$126,000
Instrument & Control Specialist	1	$ 53,000 - $ 67,500	$ 67,500	$ 67,500
Meter Supervisor	1	$ 46,500 - $ 66,500	$ 66,500	$ 66,500
Meter Specialist	2	$ 40,500 - $ 57,500	$ 57,500	$115,000
Standards Engineer	1	$ 49,500 - $ 74,000	$ 74,000	$ 74,000
Materials Management Supervisor	1	$ 43,000 - $ 61,000	$ 61,000	$ 61,000
Materials Management Specialist	1	$ 32,000 - $ 45,500	$ 45,500	$ 45,500
Materials Inventory Technician	2	$ 26,500 - $ 40,000	$ 40,000	$ 80,000
Systems Operator	2	$ 45,500 - $ 64,000	$ 64,000	$128,000
GIS Mapper	1	$ 38,000 - $ 55,500	$ 55,500	$ 55,500
Developer/Programmer	1	$ 59,500 - $ 85,500	$ 85,500	$ 85,500
Administrative Specialist	3	$ 36,500 - $ 45,000	$ 45,000	$135,000
Field Service Manager	1	$ 80,000 - $112,000	$112,000	$112,000
Line Supervisor	2	$ 70,500 - $ 81,000	$ 81,000	$162,000
Line Crew Supervisor	4	$ 48,500 - $ 69,000	$ 69,000	$276,000
Line Specialist	6	$ 46,000 - $ 66,000	$ 66,000	$396,000
Line Technician	6	$ 37,000 - $ 53,500	$ 53,500	$321,000
Electric Ground Worker	2	$ 30,500 - $ 44,000	$ 44,000	$ 88,000
Line Equipment Operator	2	$ 31,500 - $ 44,000	$ 44,000	$ 88,000
Electric Service Supervisor	1	$ 50,000 - $ 71,500	$ 71,500	$ 71,500
Safety/Training Coordinator	1	$ 45,500 - $ 64,500	$ 64,500	$ 65,500
Inspector	1	$ 37,000 - $ 54,000	$ 54,000	$ 54,000
Dispatcher	1	$ 30,000 - $ 41,500	$ 41,500	$ 41,500
Billing Services Supervisor	1	$ 48,600 - $ 77,750	$ 77,500	$ 77,500
Billing Services Representative	6	$ 26,000 - $ 41,500	$ 41,500	$249,000
Meter Service Technician	2	$ 26,000 - $ 41,500	$ 41,500	$ 83,000
Fleet Mechanic	1	$ 35,000 - $ 50,000	$ 50,000	$ 50,000
TOTAL	**71**			**$4,450,500**

Appendix G: Position Descriptions for Typical Organization Structure

CLASSIFICATIONS WITH DESCRIPTIONS

MANAGEMENT

Electric/Utility Director

Responsible and accountable for developing, managing and leading strategies and vision of the Municipal Electric Utility. Provides efficient and effective delivery of electric utility services. Provides leadership and guidance across a functional organization. Must have extensive Electric Utility experience in public power.

ENGINEERING/OPERATIONS

Engineering/Operation Manager

Responsible for managing and leading operating strategies to support Electric Utilities vision statement and Department strategies. Provides leadership and guidance across a functional organization. Establishes annual budgets; ensures efficient and effective delivery of electric utility services; resolves complex customer disputes and operations problems and issues. Responsibilities include: field engineering, material and equipment standards, materials management, metering, substations, resource supply, key customer accounts and energy conservation.

Engineering Supervisor

Responsible for performing professional electric engineering activities. Supervising, coordinating, developing and making recommendations and implementing policies, procedures, business processes and standards concerning electric engineering practices and techniques. Responsibilities include: material and equipment standards, materials management, metering, substations, system planning/coordination, project design, SCADA systems and mapping systems.

Project Engineer

Responsible for performing professional level engineering activities on medium to large projects. Performs project management for engineering projects. Coordinating, developing, making recommendations and implementing policies, procedures, business processes and standards concerning engineering practices and techniques. Monitors changes and trends in regulations. Conducts studies and research.

Electric Engineer

Responsible for performing electric engineering activities on routine projects or segments on medium to large projects under the direction of the Engineering Supervisor. Prepares engineering drawings and schematics. Performs engineering work and analysis for programs and operations.

Field Engineering Supervisor

Responsible for planning, coordinating and supervising the design, plan, preparation and coordination of commercial/industrial/residential electric distribution, service and street light engineering projects. Duties include: reviewing plans for compliance with electric standards and material specifications. Knowledge of electrical theory, as it relates to design and construction of electric projects; overhead and underground distribution systems, utility accounting procedures, computers and software, to include CAD systems, federal, state and local laws and standards.

Field Engineer Specialist

Responsible for the design of commercial/industrial/residential electric distribution, service and street light engineering projects. Duties include: designing plans and ensuring compliance with electric standards and material specifications. Knowledge of electrical theory, as it relates to design and construction of electric projects; overhead and underground distribution systems, utility accounting procedures, computers and software, to include CAD systems, federal, state and local laws and standards.

Electric Utility Rate Analyst

Responsible for developing pricing strategies and philosophies. Develops and maintains complex costing and pricing models by analyzing and applying economics and marginal costing techniques. Represents the organization regarding pricing matters at both the regional and national level. Knowledge of electric industry structure, trends and regulations; rate design principles and application.

Resource Supply Supervisor

Responsible for insuring the projected customer load demand is met in the most economic and efficient manner while adhering to operating system constraints and industry/regulatory guidelines. Performs analysis to predict and plan for load, supply resource and/or reserve obligations. Negotiates short-term purchases and sales contracts. Responds to changing load and supply resource situations. Ensures appropriate rates are charged per negotiated contracts. Schedules bulk power on a real time basis.

Key Accounts Specialist

Responsible for establishing, managing and enhancing relationships with residential, commercial, industrial and government customers. Develops and implements solutions to customer problems. Provides major customers with a single point of contact. Communicates needs and interests of customers to include decision-making, planning and mediating disputes.

Conservation Specialist

Responsible for all activities from initial concept to design through development and implementation of broad, strategic plans and complex, technical programs that support the organization's conservation, demand-side management and renewable energy goals.

Substation Supervisor

Responsible for the supervision of the installation, operation, troubleshooting, switching, testing and maintenance of electric substations, equipment and components.

Substation Specialist

Under the direction of the Substation Supervisor, responsible for installation, operation, troubleshooting, switching, testing and maintenance of electric substations, equipment and components. To include: adjusting, calibrating, repairing and replacing substation equipment; testing substation components using sophisticated test equipment; performing equipment inspections and preventative maintenance; reading and analyzing construction prints, schematics, circuit diagrams and electrical layouts.

Instrument and Control Specialist

Responsible for installing, calibrating, maintaining, testing, troubleshooting, tuning and repairing electronic, electro-mechanical and mechanical equipment and telemetry, communications, control, SCADA, instrumentation and protective relaying systems.

Meter Supervisor

Responsible for the supervision of meter testing, calibration, failure analysis and overall integrity of metering equipment.

Meter Specialist

Responsible for meter testing, calibration, failure analysis and overall integrity of metering equipment. Responsible for receiving and testing all meters.

Standards Engineer

Responsible for engineering support in the area of standards and/or quality control. Investigates material and/or equipment malfunctions and defects. Provides, develops and maintains material requirements, specifications and standards. Verifies accuracy of material specifications. Researches, evaluates and recommends new products, costs and benefits. Ensure operability and safety of material.

Materials Management Supervisor

Responsible for supervision of employees engaged in a combination of warehousing and inventory control related functions to support field construction/installation operations. Perform inventory research and vendor relationship building. Plans, conducts and schedules inventory flow (turnover), reporting, and quality control. Develops strategies of the management and control of materials in order to increase efficiencies of flow and decrease carrying costs of inventory

Materials Management Specialist

Responsible for a combination of warehousing and inventory control related functions to support field construction/installation operations. Perform inventory research and vendor relationship building. Researches inventory flow (turnover). Develops strategies of the management and control of materials in order to increase efficiencies of flow and decrease carrying costs of inventory

Materials Inventory Technician

Responsible for performing standard procedures in support of warehousing and materials management. Duties include: replenish stock in inside and outside warehouses; cycle counting; issuing and receiving returned, salvaged and junk materials; maintaining appropriate supply levels of stock and non-stock materials.

Systems Operator

Responsible for planning the day-to-day operations of the Distribution System in order to ensure maximum continuity of distribution services. Assures line clearances are established in compliance with safety rules. Review and assure accuracy of switching orders. Monitor and control the subtransmission system and substations status using SCADA (or other) network. Switching circuits using SCADA (or other) or field equipment. Ability to read construction prints and oneline maps. Computer proficient. Possess basic electrical theory principles, equipment and safety requirements and system load requirements and parameters.

GIS/FIMS Mapper

Responsible for the integrity/accuracy of electric infrastructure maps. Using a geographic information system, maintains and updates infrastructure records via as-built maps. Maintains and distributes oneline map books and responds as needed to specialized map requests.

Developer/Programmer

Responsible for the architecture, design, performance, integrity, reliability and system-wide integration of the applications, data, and/or technologies specific to the support of electric operations. Should have a good understanding of the electric business for which the applications are designed. Responsible for business recovery procedures, backup and recovery of applications. Provides recommendations on future technologies. Ensures applications maintenance, patches and upgrades are completed.

Administrative Specialist

Responsible for a wide variety of advanced administrative and support functions. Involvement in projects, programs and administrative matters. Provide administrative support to managers and others. Duties include: budget submittals, invoice payments, tracking expenditures, preparing reports, spreadsheets, and presentations.

FIELD SERVICE

Field Service Manager

Responsible for managing and leading strategies of organizational units to support Utilities vision statement and department strategies. Provide leadership and guidance. Establish and implement annual budgets; manages, plans and directs department wide projects and initiatives. Makes hiring, pay decisions and establishes performance plans. Implements strategic business goals, plans, programs and initiatives. Responsibilities include: electric line construction, line maintenance, street lights, services, emergency response, safety training, locating and contracting.

Line Supervisor

Responsible and accountable for providing leadership and guidance to those who directly support and supervise the field crews. Schedules work assignments for field crews. Reviews work performance; sets work expectations, coaches and councils as needed. Manages field activities and functions related to residential, commercial and maintenance jobs. Interprets codes, policies and procedures for employees, internal and external customers. Manages responses to outages, damages and emergency situations.

Line Crew Supervisor

Responsible for supervising and monitoring line crews and assisting in activities related to the construction and maintenance of overhead and underground electrical distribution systems, commercial, residential and arterial street lighting systems. Setting up clearance and hotline holds; ensuring compliance with safety regulations and work procedures, ensure equipment, tools and materials are used appropriately; troubleshooting electrical systems; interpreting specifications, schematics and written instructions; using computers as applicable. Assure compliance to safety standards for self and crew.

Line Specialist

Responsible for performing (under direction of a Line Crew Supervisor) specialized skilled line activities requiring journey level experience. Assist with the installation and maintenance of electric distribution systems. Ability to troubleshoot electric systems; operation of specialized equipment (voltage testers, etc.). Knowledge of electrical systems principles, voltage requirements, equipment, construction standards and material requirements. Duties include: climbing poles, compliance to safety standards, interpreting onelines and construction drawings.

Line Technician

Responsible for performing (under direction of a Line Crew Supervisor) the installation and maintenance of electrical distribution systems. Duties include: installing overhead/underground lines, laying pipe, pulling wire; climbing poles; preparing materials for line construction crew and charging to appropriate jobs, operating line construction vehicles and equipment.

Electric Ground Worker

Entry-level position. Responsible for performing (under direction of a Line Crew Supervisor) the installation and maintenance of electrical distribution systems. Duties include: installing overhead/underground lines, laying pipe, pulling wire; climbing poles; preparing materials for line construction crew and charging to appropriate jobs, operating line construction vehicles and equipment.

Line Equipment Operator

Responsible for performing skilled work operating a wide variety of heavy equipment in the maintenance and repair of utility distribution systems. Duties include: operating heavy equipment - track backhoes, bulldozers, overhead cranes, boom trucks. Transporting equipment to job site.

Electric Service Supervisor

Responsible for supervising and monitoring crews and assisting in activities related to the construction and maintenance of underground and overhead service and street lighting for residential and arterial street lighting systems. Ensuring compliance with safety regulations and work procedures, ensure equipment, tools and materials are used appropriately; troubleshooting systems; interpreting specifications, schematics and written instructions; using computers as applicable. Assure compliance to safety standards for self and crew.

Safety/Training Coordinator

Responsible for identifying safety and occupational health hazards; providing advice and guidance to management regarding loss prevention; development of safety training materials. Conducting investigations and surveys and/or delivery of safety training in the electric arena. Recommends program or procedure modifications. Provide environmental, health and safety training to employees. Perform accident investigations, Interpret environmental, health and safety regulations.

Inspector

Responsible for scheduling and coordinating a wide variety of construction and/or landscaping projects in support of electric projects. Inspection and reviewing installations of work sites. Conducts pre-construction inspections of job sites to evaluate readiness of site for utility construction and ensure compliance by requestors. Reviewing survey staking, curb, gutter and street construction, residential and commercial construction conflicts, utility conflicts and construction safety issues. Coordinate site readiness with applicable staff.

Dispatcher

Responsible for leading the central point of communication for electric personnel. Coordinating communications and information with field crews, mobile units and other personnel. Responds to telephone requests for emergency and non-emergency assistance and dispatch to applicable field crews. Prepare and maintain records, logs, reports, maps and directories.

CUSTOMER SERVICE

Meter Service Technician

Responsible for accurately reading and logging water meter data. Reading meters for residential, commercial and industrial customers.

Billing Services Supervisor

Under general direction, responsible for the direction, management and coordination of billing operations for utility services. Supervises customer service staff, manages the performance of computer systems and service provides and perform related duties as required.

Billing Services Representative

Responsible for preparing and processing utility billing data, analyzing and resolving billing anomalies. Assisting the public with City Code governing billing and payment procedures. Provides customer service in person and by telephone.

FOR INFORMATION PURPOSES ONLY

FIELD SERVICE REPRESENTATIVE - $35,000 - $50,000

Responsible for providing on site service to residential and small commercial account customers to resolve concerns regarding billing, consumption and service delivery. Assists with budgeting utility bill payments and conservation.

FIELD COLLECTOR - $34,000 - $48,000

Responsible for using department guidelines to remedy utility accounts. Collects customer payments on site or arranges customer payment. Disconnects and/or reconnects electric service.